UNITED STATES PATENT APPLICATION

FOR

METHOD AND APPARATUS FOR SYNCHRONIZING AN EMAIL CLIENT ON

A PORTABLE COMPUTER SYSTEM WITH AN EMAIL CLIENT ON A DESKTOP COMPUTER

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Method And Apparatus For Synchronizing An Email Client On

A Portable Computer System With An Email Client On A Desktop Computer

FIELD OF THE INVENTION

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The present invention relates to the field of portable computers

systems. Specifically, the present invention discloses a systems for

synchronizing an email client on a portable computer system with an email

client on a desktop computer system.

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BACKGROUND OF THE INVENTION

Personal computer systems have become common tools in

modern society. One of the most important uses for personal computers is

15   electronic mail (email). Personal computer users use email to send notes and

computer files to other computer users.

Many personal computer users also use small portable palmtop

computer systems such that the personal computer user can carry important

20   personal information. To store the important personal information, palmtop

computer systems usually provide Personal Information Management (PIM)

applications such as an address book, a daily organizer, and a To-Do list

applications.

In addition to the Personal Information Management (PIM) applications, it would be desirable to have an email application on the palmtop computer system. The email application would allow the user to send and receive email messages using the palmtop computer system.

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Although an email application on palmtop computer system would be very useful, such an application can create problems. For example, would incoming email arrive on the desktop personal computer system, the portable computer system or both? Furthermore, if the user deleted an email

10 message on one of the two computer systems, should that email message appear on the other computer system? Thus, it would be desirable to have an email application for a palmtop computer system that is completely in synchronization with an email application on a desktop personal computer system.

SUMMARY AND OBJECTS OF THE INVENTION

It is therefore an object of the present invention to provide a palmtop computer system that is fully integrated with common email systems used by desktop personal computers. To accomplish this goal, the present invention introduces an email client for the portable computer system and an email synchronization conduit for a desktop personal computer system.

The email client for the portable computer system allows the user to view incoming email messages. The email client on the portable computer system also allows the user to compose outgoing email messages.

The email synchronization conduit on the desktop personal computer system is responsible for synchronizing the state of the portable computer email client with an email client on a personal computer system. After a synchronization event, the email synchronization conduit ensures that the email state on the portable computer system exactly matches the email state on the desktop personal computer system. For example, if an email message is deleted on email client of the portable computer system then a matching copy of that email message will be deleted from the desktop personal computer system. Similarly, if an email message is deleted on the email client of the desktop personal computer system then that email message will be deleted from the portable computer system. By keeping the email state of the two different computer systems in exact synchronization,

the user can switch between the email client on the portable computer system and the email client on the desktop personal computer system without missing a message or reading a redundant message.

BRIEF DESCRIPTION OF THE DRAWINGS

The objects, features, and advantages of the present invention will be apparent from the following detailed description of the preferred embodiment of the invention with references to the following drawings.

Figure 1a illustrates a portable computer system and a personal computer system equipped with a cradle for synchronizing with the portable computer system.

Figure 1b illustrates a block diagram that depicts the software architecture for synchronizing information on the portable computer system with information on a desktop personal computer system.

Figure 2a illustrates a block diagram that depicts the software architecture for synchronizing email on the portable computer system with email on the desktop personal computer system using the Microsoft® MAPI protocol.

Figure 2b illustrates a block diagram that depicts the software architecture for synchronizing email on the portable computer system with email on the desktop personal computer system using the Lotus® VIM protocol.

Figure 3 illustrates a flow diagram that describes how email on the desktop personal computer system is synchronized with email on the portable computer system.

DETAILED DESCRIPTION

Methods and apparatus for implementing a palmtop computer system that is well integrated with a personal computer system is disclosed. In the following description, for purposes of explanation, specific nomenclature is set forth to provide a thorough understanding of the present invention. However, it will be apparent to one skilled in the art that these specific details are not required to practice the present invention. In other instances, well-known circuits and devices are shown in block diagram form to avoid obscuring the present invention.

Basic Synchronization

Figure 1a illustrates a portable computer system 130 that communicates and synchronizes information with a personal computer system 110. To synchronize the information in the two computer systems, a user places the portable computer system 130 into the cradle 120 and presses synchronization button 125. The synchronization button 125 activates a synchronization program on the portable computer system 130. The synchronization program on the portable computer system 130 communicates with a peer synchronization program on the personal computer system 110. The two synchronization programs synchronize the information on the two computer systems.

Figure 1b illustrates a block diagram of the software components that perform the synchronization of the two computer systems. In Figure 1b, the portable computer 160 has two different programs, program A and program B, that execute on the portable computer 160. Program A and

5   program B use a common database 163 to store their data.

Referring to Figure 1b, a synchronization cradle 180 is illustrated below the portable computer 160. The synchronization cradle 180 has a button 185 that activates a synchronization Program (HotSync) 161 in the

10   portable computer system 160. When activated, the HotSync Program 161 communicates with the peer synchronization program (HotSync Manager) 170 in the personal computer 150. The HotSync Manager 170 operates by executing a series of conduit programs such as conduit program A and conduit program B illustrated in Figure 1b. Each conduit program is used to

15   synchronize the information associated with a particular program on the portable computer system. Conduit programs can also perform additional tasks such as software installation. A full description of the synchronization architecture can be found in the U.S. patent application entitled " Extendible Method and Apparatus for Synchronizing Multiple Files On Two Different

20   Computer Systems" having Serial number 08/542,055, filed on October 13, 1995.

In Figure 1b, conduit program A and conduit program B are used to synchronize the data for application program A and application program B

25   on the portable computer 160 respectively. The HotSync Manager 170

communicates with the HotSync Program 161 in order to access the database 163 on the portable computer 160. The necessary records from of the database 163 are copied to the personal computer such that the conduit programs on the personal computer can process the records. In the example of Figure 1b, the records from database 163 that are associated with application program A and application program B are copied into the personal computer and then reconciled with databases A and database B by conduit A and conduit B respectively. After the records have been synchronized, the synchronized records are written back to the database 163 on the portable computer system 160.

Email Synchronization

Synchronizing email information is not as simple as synchronizing a simple database such as an address list. To fully describe how the present invention synchronizes an email client program on a desktop personal computer system with an email client program on a portable computer system, a detailed description is provided with reference to **Figures 2a, 2b, and 3.**

Figure 2a illustrates the general software architecture for synchronizing an email client program on a desktop personal computer system with an email client program on a portable computer system. In the example of **Figure 2a,** the email client program on the personal computer

uses the Microsoft MAPI protocol. However, other email protocols may also be used as will be described later.

Figure 2a illustrates a portable computer system 210 having an
5   email client program 211. The email client program 211 works with email records stored in the database 215. The email client program 211 allows the user to view received email stored in the database 215. The email client program 211 also allows the user to compose new email messages to be sent to other computer users.

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The portable computer system requires a connection to a computer network infrastructure to receive new email and to send newly composed email messages. To connect with the computer network infrastructure, this document describes a synchronization environment
15   wherein the portable computer is coupled to a personal computer using a serial link as depicted in Figures 1a, 1b, and 2a. However, many other methods of connecting the portable computer system to a personal computer system as described in the patent application "Method And Apparatus For Synchronizing A Portable Computer System With A Desktop Computer
20   System" filed on _____, with Serial number _____.

To update the email records stored in database 215, the user can place the portable computer system 210 into a cradle coupled to a personal computer through a serial link. The user presses a syncrhonization button on
25   the cradle to activate a HotSync Program 217 on the portable computer system

210. The HotSync Program **217** on the portable computer system **210** communicates through the serial link with a HotSync Manager Program **231** on the personal computer system. The HotSync Manager Program **231** executes a number of conduit programs to synchronize databases including an email conduit program **233** to synchronize the email information.

To synchronize the email records from the portable computer system, the email conduit **233** communicates with a MAPI software layer **253** in the operating system software of the personal computer **250**. The MAPI software layer **253** provides a limited set of routines for manipulating email on an email server. Detailed information about the MAPI software layer can be found in the Microsoft Developer Network documents published by the Microsoft Corporation.

Referring to **Figure 2a**, a MAPI-compliant email server **280** is connected to a computer network **270** that is also coupled to the personal computer system **250**. To access the email information on the MAPI-compliant email server **280**, an application program on the personal computer **250** can issue MAPI compliant requests to the MAPI software layer **253**. The MAPI software layer **253** transmits a request packet across the computer network **270** to the MAPI compliant email server **280**. In response to the properly formatted MAPI requests, the MAPI-compliant email server **280** sends information back to the MAPI software layer **253**.

For example, the Microsoft Mail email client program 240 on the personal computer system can send and receive email by issuing requests to the MAPI software layer 253. The MAPI software layer 253 transmits the requests through the appropriate network software to the MAPI-compliant

5   email server software 281 on a server 280. The MAPI-compliant email server software responds through the network 270 back to the MAPI layer and thus back to the mail client software 240.

To send and received email, the email conduit 233 uses the same

10   infrastructure. Thus, the email conduit 233 also makes requests to the MAPI software layer 253. The MAPI software layer 253 transmits the requests from the email conduit 233 through the appropriate network software to the MAPI-compliant email server software 281 on server 280.

15   It should be noted that the email server software 281 on server 280 maintains the email "state" for each user that the email server services. Specifically, the email server software maintains a set of active email messages for each user. By communicating through the MAPI software layer 253, the email conduit 233 can synchronize the email records on the portable

20   computer system 210 with the email information on email server software 281 on server 280.

Figure 3 illustrates a flow diagram that describes how the email client conduit 233 on the personal computer system 250 synchronizes the

25   email state on the portable computer system 210 and the personal computer

system 250. First, at step 310, the email conduit 233 retrieves all the outgoing email from the portable computer system 210. This outgoing email is sent to the email server software 281 using MAPI commands such that the outgoing email is sent to the desired recipient. At step 315, the email conduit

5   determines if the user has selected a "send-only" mode. The send-only mode allows the user to shorten synchronization sessions by only sending outgoing email. If the user has selected the send-only mode the email client is done and stops at step 317. Otherwise the email conduit continues to synchronize the email in database 215 with the email on the email server software 281.

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At step 320, the email conduit 233 reads all the email for the user from the email server 281. If the email conduit 233 cannot read the email from the server then the conduit will terminate since it cannot obtain the information necessary for the synchronization. After reading all the email

15   from the email server 281 the email conduit 233 then reads all the email stored in the database 215 in the portable computer system at step 330.

At step 335, the email conduit 233 checks to see if this is a synchronization with the same personal computer that was used to perform

20   the previous synchronization. If this is the same personal computer, then the email from the portable computer system will have valid status flags that specify the new, changed and deleted email from the portable computer system. However, if this is not the same personal computer that was used in the previous synchronization then the conduit proceeds to step 337 where it

25   compares the email from the portable computer system with the email from

the last synchronization to determine the new, changed and deleted email from the portable computer system. Additional information about the system of using a state from a previous synchronization is available in the U.S. patent application entitled "Method and Apparatus for Synchronizing

5   Information on Two Different Computer Systems" with Serial number 08/544,927, filed on October 18, 1995.

Next, at step 340, the email from the email server 281 is compared with the email retrieved from the portable to determine the new,

10   changed and deleted email from the email server 281. After this step the email that is new, changed or deleted from the email server 281 is available.

The final step is then to synchronize the email information from the email server 281 and the email information from the portable

15   computer system. To accomplish this goal, the email conduit 233 uses the list of the new, changed and deleted email from the portable computer system and the list of the new, changed and deleted email from the email server 281. Specifically, the list of the new, changed and deleted email from the portable computer system is used to modify the email on the email server 281 and the

20   list of the new, changed and deleted email from the email server 281 is used to modify the email information on the portable computer system. Thus, at step 350, if an email message has been deleted from the email server 281 then that email message is deleted from the email list on the portable computer system. Similarly, if an email message has been deleted from the then that

25   email message is deleted from the email server 281 email list on the portable

computer system. If an email message has been modified on either system then that email message is modified on the other system. For example, if email has been marked as read on either system then the email is marked as read on the other system. Finally, if new email has been received by the email server 281, then that new email is copied into the database in the portable computer system.

The techniques illustrated with reference to the MAPI based email system of **Figure 2a** can be used in other email systems. For example, **Figure 2b** illustrates a similar mail arrangement. In **Figure 2b**, the server 280 is running the Lotus® cc:mail server software 283 on the server 280. To communicate with the Lotus® cc:mail server software, a VIM software layer 257 is placed in the system software of the personal computer system 250. The VIM software layer 257 is used by the Lotus® cc:mail client program 242. Since the VIM and MAPI software layers are very similar, the same method described in **Figure 3** can be used to synchronize email on systems use the VIM protocol.

Although the present invention has been described in terms of specific exemplary embodiments, it will be appreciated that various modifications and alterations might be made by those skilled in the art without departing from the spirit and scope of the invention as set forth in the following claims.